

**Abstract:      Utilization of Ion Implanted Silicon Charged Particle Detectors in Low Background Alpha / Beta Counting Systems for Radon, Thoron and progeny compensation.**

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For well over thirty years, Gas Flow Proportional Counters have been the detector of choice for low background alpha / beta counting systems. While these detectors offer performance characteristics well suited for the analysis of air filters, swipes, evaporated water and other liquids and more, they are not without their drawbacks.

Gas flow proportional counters exhibit extremely low leakage currents and very low capacitance that make them ideal for the detection of alpha and low energy beta particles. While the noise of a typical gas flow proportional counting system is excellent, charge collection and thus charge recombination, is not.

Canberra Harwell initiated this endeavor with the development of the iCAM, intelligent Continuous Air Monitor. An algorithm was developed that evaluates a pulse-height spectrum for the presence of alpha peaks and/or beta continuum. If present, the three major Radon and Thoron peaks (8.78 MeV, 7.68 MeV and 6.0 MeV) are evaluated for their total contribution, particularly in the spectrum region where the peaks of Uranium, Plutonium, Americium, Curium, etc would be located. The contribution of these peaks is subtracted from the spectrum and the residual spectrum provides a clear indication of the presence or absence of the alpha peaks of these isotopes of concern.

Canberra Tennelec, with Canberra Harwell, extended the capabilities of this algorithm and has incorporated it into a Low Background Alpha / Beta Counting system for the analysis of air filters and swipes of nearly all types and sizes, the iSolo. The advantages of such a counting system are many. It does not, for example, require gas to operate and it dramatically reduces the time required to make an accurate decision about the condition of an area that may or may not have air borne, long half-life alpha emitters present. Information about the algorithm utilized for these analysis and the systems available that incorporate this approach to alpha / beta counting, will be presented.